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Author: Mr. Daniël van der Merwe
DENEL Spaceteq, South Africa, nvdmerwe@spaceteq.co.za

DEVELOPMENT OF A THERMAL CONTROL SYSTEM FOR SOUTH AFRICA'S NEXT
GENERATION EARTH OBSERVATION SATELLITE

Abstract

This paper gives an overview of the work done in developing a thermal control system (TCS) for South Africa's next generation earth observation satellite, EO-SAT1. Correlated thermal models of critical major components were developed based on lessons-learned from SumbandilaSAT (South Africa's first national satellite). These include amongst others a generic electronic housing unit and a typical solar panel. In addition, the thermo-optical properties of commonly-used coatings and surfaces were also measured, along with heat transfer characteristics of mechanical interfaces. Based on this data a thermal model of the complete satellite was built using NX Space Systems Thermal software. A quick software validation was performed by analysing radiation exchange on the internal and external faces of a thin-walled box, as well as space environmental radiation. The performance of the TCS design was evaluated using the NX Space Systems thermal model. During the TCS evaluation different orbital and positional parameters were considered, as well as different mission scenarios. The evaluation showed that the proposed TCS design would satisfy most of the thermal requirements.